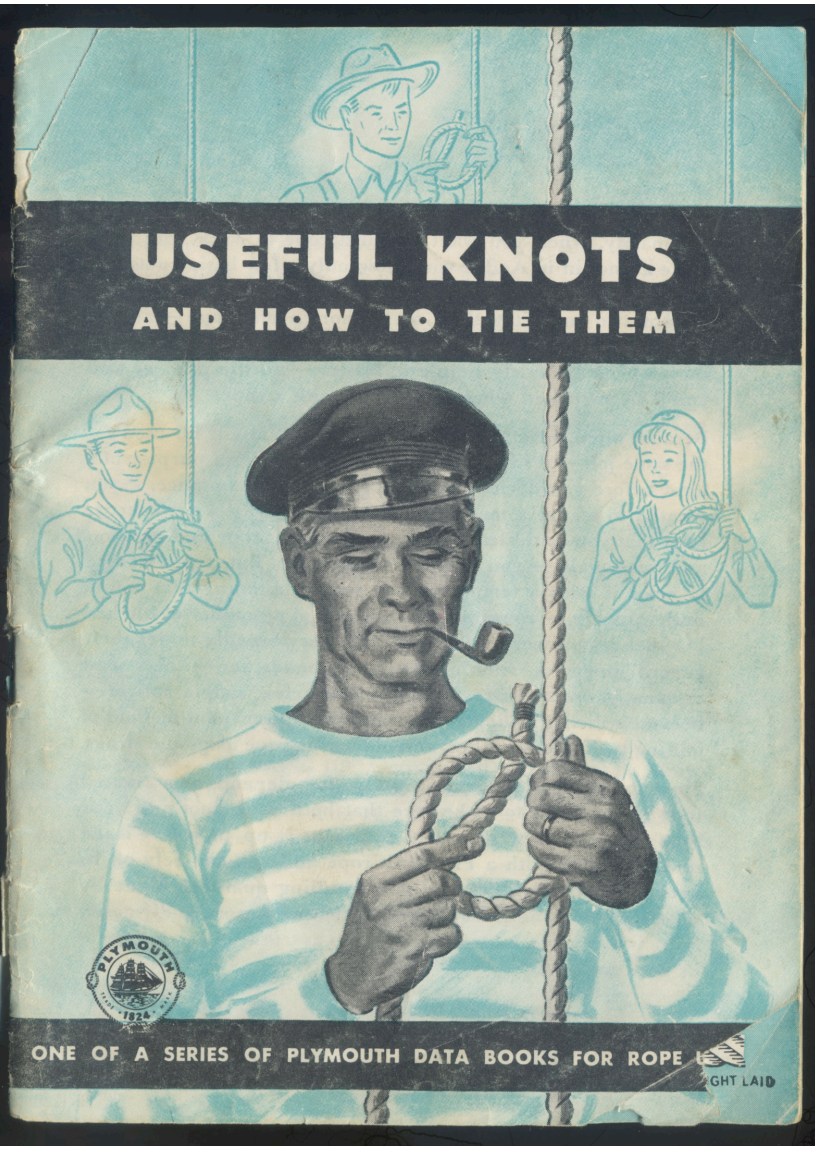
USEFUL KNOTS
AND HOW TO TIE THEM
PLYMOUTH
1824
ONE OF A SERIES OF PLYMOUTH DATA BOOKS FOR ROPE
GHT LAID

KNOW YOUR KNOTS

AND THEY'LL SERVE YOU WELL

Ordinarily, when you want to put a rope to work, you have to tie a knot in it. And if you know only a few basic knots you can make your rope work much more efficiently. Knots are used to join two ropes together, or to shorten one rope — and to "tie up", tow, haul, hoist and support objects. Most of the knots shown here are fairly simple to master — a little practice and you'll be surprised what you can do with a rope.

Because often, several quite different knots might be used for the same job — it's important to know the general purpose of a knot before you decide on the best to use. For instance, if you wanted to secure a mooring line to a post with a very secure knot that you could leave in the end of your rope and use over and over again — you might use a bowline. But if you wanted to moor it with a temporary but secure fastening that would untie quickly — you could use any one of a number of hitches. For that reason we've tried to classify very broadly under their general purposes, some of the knots, bends and hitches most commonly used. We've included also a few simple splices — because splicing is the strongest and most permanent method of joining two ropes together, and of making rope loops and slings.

Since the safety of life and property often depends on a knotted rope — you want to make sure that both your knot and your rope are good. The success of your *knot* is up to you — make sure you tie it with a Plymouth rope and you can rely on its strength, dependability and safe handling qualities. Made by America's oldest and largest cordage manufacturers — Plymouth Rope is known by all who know ropes as truthfully living up to its famous slogan

THE ROPE YOU CAN TRUST

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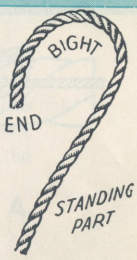
TERMS

USED IN HANDLING AND TYING ROPE

IN KNOTTING — A Rope Has 3 Parts



1. **THE END** is the end of the rope with which you are working when you tie a knot.
2. **THE STANDING PART** is the inactive length of the rope.
3. **THE BIGHT** is the central part of the rope between the working end and the standing part.

AN OVERHAND LOOP is made by crossing the end *over* the standing part.

AN UNDERHAND LOOP is made by crossing the end *under* the standing part.

A TURN is taken by looping the rope around an object — often another section of itself.

A ROUND TURN is taken by looping the rope *twice* around an object, as shown.

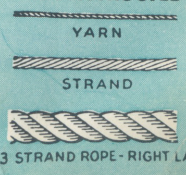
"OVER-AND-UNDER" SEQUENCE In tying a knot, whenever two sections of the rope cross each other, one must go *over* and the *other*, under. Be careful to follow this "over-and-under" arrangement exactly—otherwise you get either an entirely different knot or no knot at all.

"DRAWING UP" Once formed, a knot must be "drawn up" or tightened, *slowly and evenly* to make sure that all sections of the knot arrangement keep their place and their shape. Quick or careless tightening may result in a useless tangle.

AND—YOU'LL FIND IT HELPS TO NOTE HOW ROPE IS CONSTRUCTED

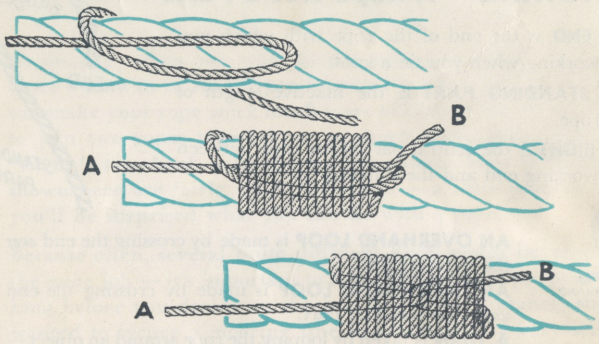
STANDARD ROPE has three strands. A *strand* is made of a number of *yarns* twisted together.

THE LAY of a rope is the direction in which the strands are twisted. Most rope is "right-laid"—the strands spiraling upward to the right—when you hold it vertically.



WHIPPING

KEEPS ROPE ENDS FROM UNRAVELLING



A good rope deserves good care. One way to keep your rope in good condition is to "whip" or bind the ends to prevent unravelling. In Splicing (see p. 23) the separate strands of the rope are also whipped for the same reason.

To make the whipping, a fine yarn, marline or spunyarn, is generally used. The ordinary whipping is made by placing the end of the yarn at the end of the rope and then laying a loop along the rope. You then wind the yarn tightly around both loop and rope, thus binding them together. Wind to a distance roughly equal to the diameter of the rope you are whipping.

The whipping is finished by putting the winding end B through the loop — then pulling end A tight, until the loop is drawn back out of sight. Both ends are then cut short to make a neat finish.

USE STOPPER KNOTS

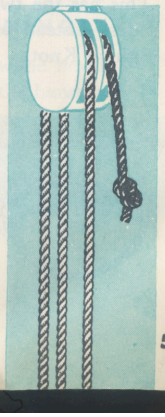
TO KEEP ROPE ENDS FROM SLIPPING THROUGH AN OPENING

End or Stopper Knots are generally tied to keep a rope end from slipping out of a hole or a pulley — also to stop a rope end from sliding through the loop of another knot and thus untying. (See the Honda Knot, p. 12 and the "Neck Halter", p. 17.) Stopper Knots are often used to keep the ends of cord or twine from fraying.

THE OVERHAND KNOT

This is the simplest and smallest of all knot forms and the beginning of many more difficult ones. In general, use it only on small cord and twine, since it jams and is hard to untie, often injuring the fiber. To Tie: Make an overhand loop. Pass the end *under* and up *through* the loop. Draw up tight.

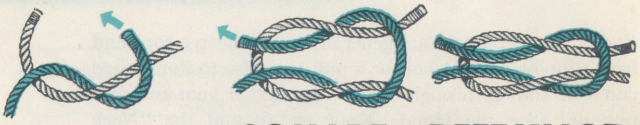
THE FIGURE EIGHT KNOT



This is much easier to untie than the Overhand Knot — is larger, stronger and does not injure rope fibers. It is the best knot to use to keep the end of a rope or "fall" from running out of a tackle or pulley. To Tie: Make an underhand loop. Bring the end around and *over* the standing part. Pass the end *under*, and then up *through* the loop. Draw up tight.

USE BINDING KNOTS

TO TIE ONE OR MORE OBJECTS SNUGLY TOGETHER



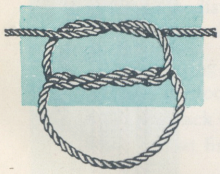
THE SQUARE OR REEF KNOT

Used at sea in reefing and furling sails — ashore as the universal package knot for parcels and bundles. Though often used, it is a dangerous knot for tying two ropes together, since it unties easily when either free end is jerked. To Tie: Pass the left end *over* and *under* the right end. Curve what is now the left end towards the right. Cross what is now the right end *over* and *under* the left. Draw up tight.

DON'T TIE THE WEAK GRANNY KNOT

Remember that the Square Knot presents two ends lying together *under* one loop and *over* the opposite loop—while the Granny presents one end under and one over on *both* loops. *Watch out for the Thief Knot, too.* This has the two loose ends coming out of *opposite* sides—instead of from the same side as in the true Square Knot.

THE SURGEON'S KNOT



Often used for twine — chiefly to keep the first tie from slipping before the knot is completed. To Tie: With one end, take three turns about the other end. Bring both ends up. Pass one end over and under the other end. Draw up tight.

USE LOOP KNOTS

TO HOLD TO AN OBJECT WHEN SECURITY COMES FIRST

A Loop Knot, like a Hitch, fastens a rope to another object. But usually, the Loop Knot is first tied in the hand and then placed over the object — while the Hitch is tied directly around the object. In general, the Loop Knot is a more secure and permanent type of knot than the Hitch, because properly tied and drawn tight, it will not slip. Also, since it does not lose its shape, the same knot may be used many times over.

THE BOWLINE—USED FOR MOORING, HITCHING, LIFTING, AND JOINING

Sometimes called the "king of knots", the Bowline never jams or slips if properly tied. Generally tied in the hand, it can also be used as a hitch and tied directly around the object.

To Tie: Make an overhand loop with the end held toward you. Pass the end up through the loop, then up behind the standing part — then down through the loop again. Draw up tight.

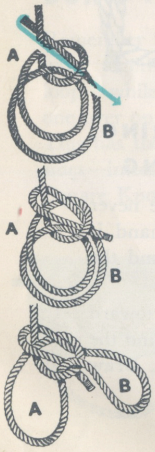
SOME USES OF THE BOWLINE

Two Interlocking Bowlines can be used to Join Two Ropes Together

A Bowline is Tied in the end of a Rope for Hoisting –

The Bowline is Tied in a Hawser and Thrown over a Post when Mooring

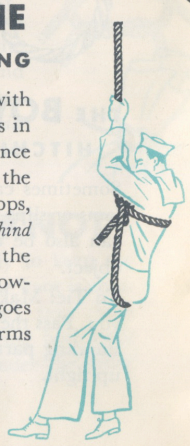
A Bowline can be tied as a Hitch – directly around a Post or a Ring when mooring a boat or hitching a horse.



THE DOUBLE BOWLINE

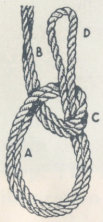
MAKES A GOOD SEAT SLING

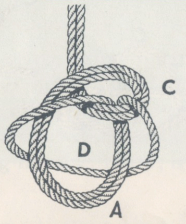
To Tie: Make an overhand loop with the end held toward you, exactly as in the ordinary Bowline. The difference being that you pass the end through the loop *twice* — making *two* lower loops, A and B. The end is then passed *behind* the standing part and down through the first loop again as in the ordinary Bowline. Pull tight. Outside loop B goes under the arms — inside loop A forms the seat.

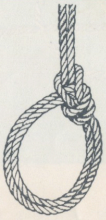


USE THE BOWLINE ON BIGHT

TO LIFT AN INJURED MAN



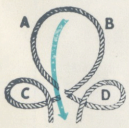


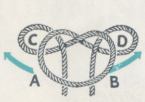


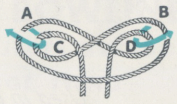
To Tie: Double the rope, make overhand loop C, and draw loop-end D up through it. Then pass loop end D, towards you, down and over loop section A. Bring up in back until D lies behind standing part A. Draw loop D tight by a slow even pull on upper right side of loop A. To use, one leg is put through each loop and Loop D passed under arms as shown at right.

THE SPANISH BOWLINE

LIFTS A MAN OR SLINGS A LADDER

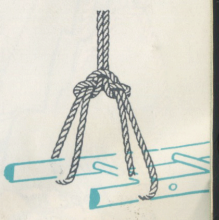




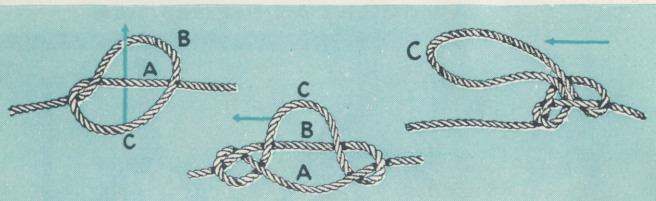


Form three loops, as shown, in any central section of the rope. Turn the large center loop A-B down. Enlarge it so that it encircles the smaller loops C and D. Put your hands through each of the small loops C and D, grasp each side of large loop A and B . . . and pull up through to complete the knot.

Used to lift an injured man like the Bowline on Bight, above — or to sling a ladder as shown.



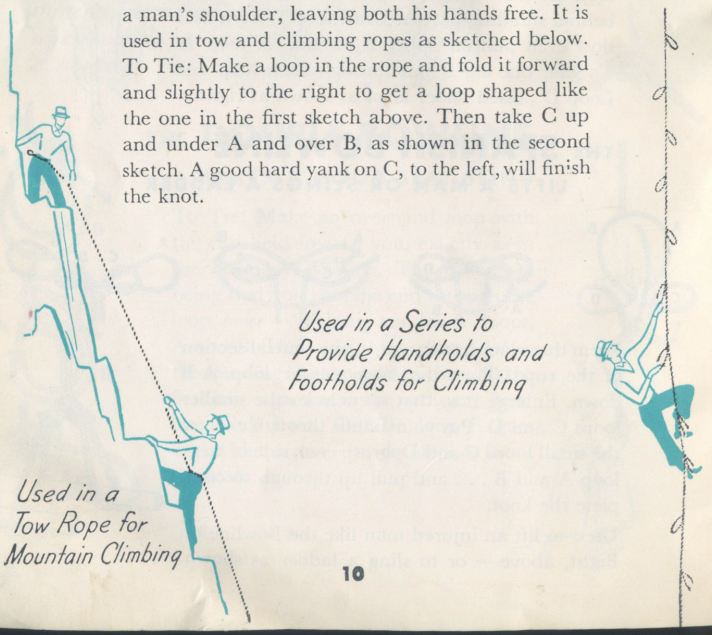
A USEFUL LOOP KNOT



THE MAN HARNESS

USED FOR HAULING, MOUNTAIN CLIMBING

This knot should be tied large enough to go around a man's shoulder, leaving both his hands free. It is used in tow and climbing ropes as sketched below. To Tie: Make a loop in the rope and fold it forward and slightly to the right to get a loop shaped like the one in the first sketch above. Then take C up and under A and over B, as shown in the second sketch. A good hard yank on C, to the left, will finish the knot.



Used in a Tow Rope for Mountain Climbing

Used in a Series to Provide Handholds and Footholds for Climbing

USE A NOOSE

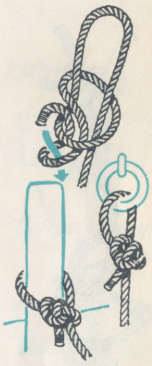
TO TIGHTEN A ROPE AROUND AN OBJECT

A Noose is a knot which draws up tight around an object when the rope is pulled. Any Loop Knot can be made into a Noose by pulling the bight of the rope a short distance through the loop. The Running Bowline, below, is a perfect illustration of this.

THE NOOSE OR HALTER HITCH

USED ON POST OR RING

Tie as shown in diagram, making sure that final tuck is made with bight near end. Then after drawing up, drop end through this bight so knot cannot fail.



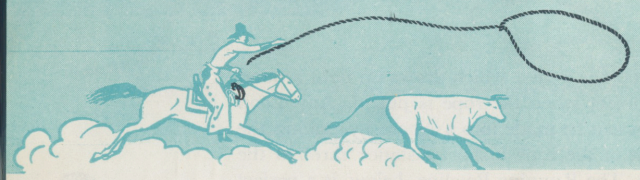
THE RUNNING BOWLINE

FOR RETRIEVING OBJECTS OVERBOARD AND PACKAGE TYING

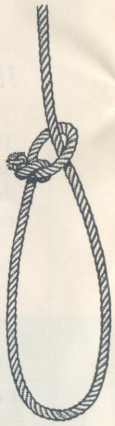
Tie the regular Bowline shown on page 7, around a loop of its own standing part. Commonly used at sea to recover spars, rigging, etc. gone adrift. A good knot to use for tightening at the beginning of tying a package.

HOW TO MAKE A LARIAT

by TOOTS MANSFIELD, National Champion Calf Roper

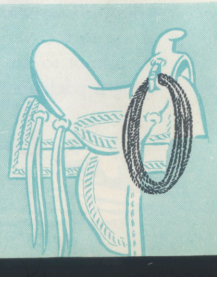


"First, unlay the strands in one end of the lariat for a short distance, tying the strands into a crown or Mathew Walker knot. This knot is simply to prevent the end of the lariat from slipping through the Honda Knot that forms the noose. To make the Honda, first tie a simple Overhand Knot in the bight of your lariat. Then tuck the end through it, leaving a round open loop. Make sure the end which forms the loop, leaves and re-enters the Overhand Knot from *opposite directions* (see diagram). Now your Honda Knot is completed, and to finish your lariat, simply pull the end through the Honda Knot, making a noose."



PLYMOUTH LARIAT ROPE

—both Manila and the new Nylon lariat—is especially made for all range and rodeo work. It is very hard-laid to give superior surface wear and slide freely.



USE HITCHES FOR

TEMPORARY FASTENINGS THAT UNTIE READILY

Most Hitches differ from Loop Knots in being tied directly around an object — instead of first being tied in the hand and then placed over the object. Hitches are generally used as a speedy, temporary means of fastening to an object and many Hitches conveniently untie by themselves when the object is removed.

THE HALF HITCH A BASIC KNOT FORM

The Half Hitch is generally used for fastening to an object for a right-angle pull. To Tie: Pass the end of the rope around the object and tie an Overhand Knot to the standing part. Figure 1 shows the Half Hitch tied with the end pulled close around the standing part. This is the first step in tying many more complicated Hitches, such as the thoroughly reliable Timber Hitch shown on page 18. But for use by itself, it is unsafe tied in this way, since it quickly slips untied. Figure 2 shows the Half Hitch tied with the end nipped under the turn of the rope some distance *away* from the standing part — this method is fairly reliable for temporary use—if the pull is steady and the arrangement is not disturbed.

1 *Untrustworthy*

2 *Fairly Reliable*

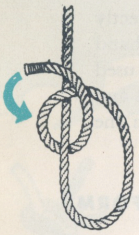
TWO HALF HITCHES

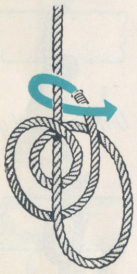
QUITE SECURE—USED FOR MOORING

Just as its name states, Two Half Hitches is simply a Half Hitch tied twice — in the manner shown in Figure 1 above. It is quickly tied, reliable, can be put to almost any general use and is the Hitch most commonly tied when mooring. It is also the usual method of tying a line to a ring hook in hand-line and pole fishing.

THE MIDSHIPMAN'S HITCH

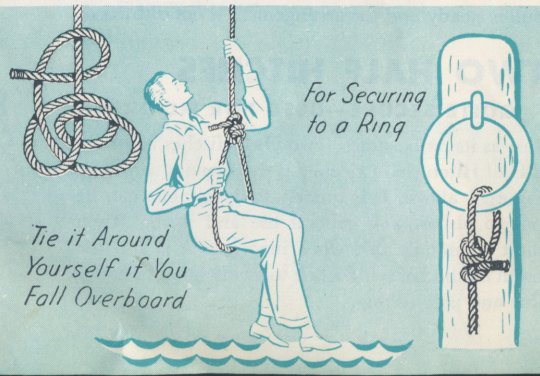
USED FOR MOORING AND LIFE-SAVING





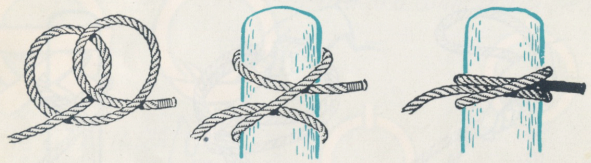
To Tie: Take a Half Hitch around the standing part. Directly above the Half Hitch and *within* the loop thus formed, take a turn. Then pass the end up through the loop and take another Half Hitch to the standing part. Tied in this way, the Midshipman's Hitch is adjustable — it can be slid to any position on the standing part where it will hold under strain.

If you ever fall overboard, tie it in the end of the rope that is thrown to you — passing it quickly under your legs, and making the Half Hitch to the standing part. Then, instead of taking the turn above the Half Hitch, take your turn *under* it, wedging it into position. Hold the free end tightly to the standing part while you're being pulled up — or if you have time, take the second Half Hitch instead.



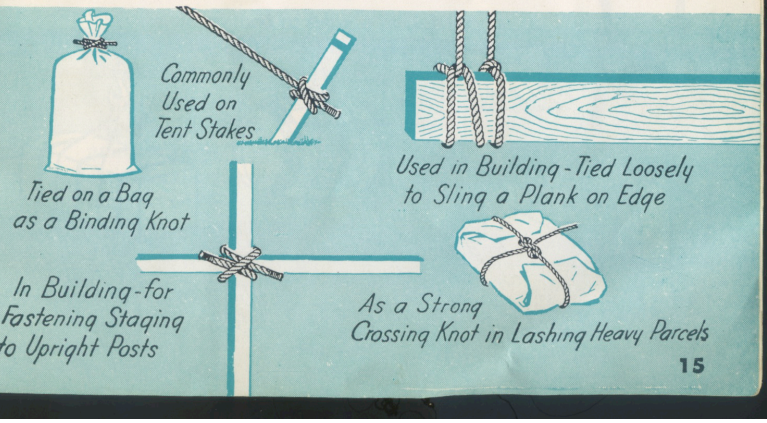
THE CLOVE HITCH

THE "GENERAL UTILITY" HITCH, ASHORE

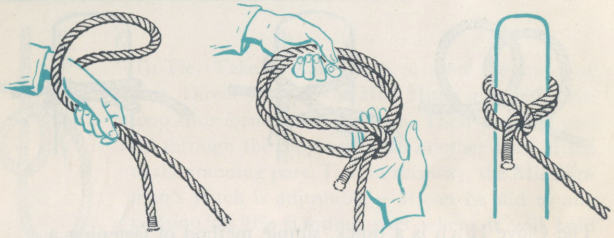


The Clove Hitch is a quick, simple method of fastening a rope around a post, spar or stake. It is sometimes called the "Builder's Hitch" because of its extensive use in fastening staging to upright posts. It can be tied in the middle or end of a rope. But since it has a tendency to slip when used at the end of a rope, the end should be half-hitched to the standing part for greater security.

To Tie: Make a turn with the rope around the object and over itself. Take a second turn around the object. Pull the end up under the second turn so it lies between the rope and the object. Tighten by pulling on both ends.


Commonly Used on Tent Stakes
Tied on a Bag as a Binding Knot
Used in Building - Tied Loosely to Sling a Plank on Edge
In Building - for Fastening Staging to Upright Posts
As a Strong Crossing Knot in Lashing Heavy Parcels

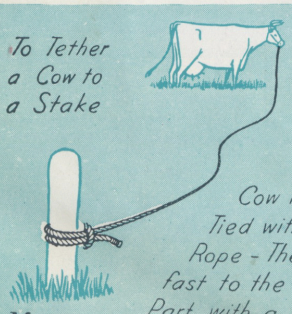
THE COW HITCH AND VARIATIONS
FOR TETHERING, MOORING, HOISTING



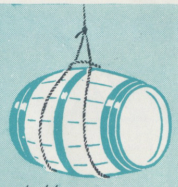
The knot formation shown as the Cow Hitch, above, is tied in the *end* of a single rope. It is identical with that used in the Bale Sling Hitch which is tied in a continuous wreath or "sling" of rope. The Ring Hitch (see next page) may be tied in either a sling or a doubled rope.

To Tie the Cow Hitch: Double the *end* of a rope to form an open loop. Reach through loop, grasping end and standing part, and pull them back through the loop. Place double loop thus formed over post and draw up tight.

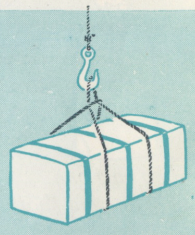
To Tie the Bale Sling Hitch: Pass the sling under the object to be hoisted. Then pull the longer loop through the upper loop.



To Tether a Cow to a Stake



Cow Hitch Hoist - Tied with a Single Rope - The End made fast to the Standing Part with a Bowline

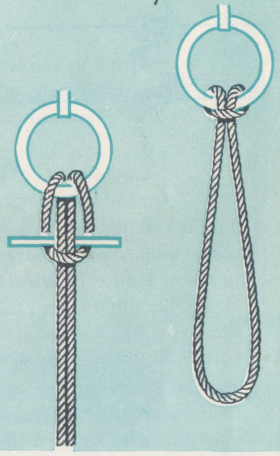


The Bale Sling Hitch - Tied in a continuous Sling of Rope

THE COW HITCH AND VARIATIONS

As the Girth Hitch Used to Secure Saddle Girths

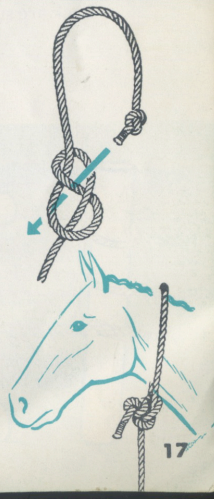
The Ring Hitch - Tied in a Sling or Double Rope



Variation - The Lark's Head with a Toggle or Pin passed through the Sides of the Loop and Behind the Standing Part. Often used as a Boat Fastening, it may be released instantly by Pulling out the Toggle –

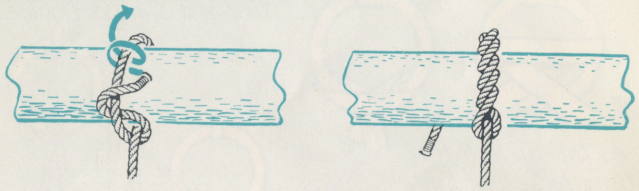
NECK HALTER
FOR HORSE OR COW

This simple method of tying a neck halter is in general use on the farm. It consists of one Overhand Knot tied in the end and a figure 8 loosely tied in the bight — far enough back to allow the length needed to go around the animal's neck. The knotted end is passed, as shown in the diagram, through the knot in the bight — which is then tightened. This forms a loop halter which will not slip and choke the animal and is easy to untie.



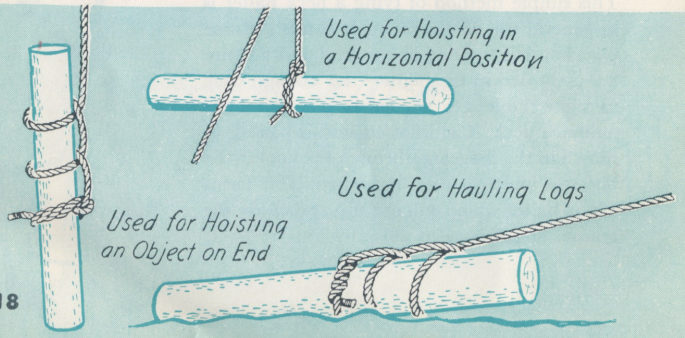
TIMBER HITCH

USED FOR TOWING AND HOISTING



This is a simple, convenient Hitch which does not jam, and comes undone readily when the pull ceases. It is used mainly to tow or hoist cylindrical objects, such as logs, spars, etc. — also in handling cargo, to hoist small crates and bales. It is used with one or more Half Hitches made with the standing part — for towing a spar or hoisting a timber on end.

To Tie: Pass a rope around the object and take a turn with the end around the standing part. Then, as shown in the diagram, twist or turn the end back on itself. Three turns back are sufficient and they should follow the lay of the rope.



THE BLACKWALL HITCH

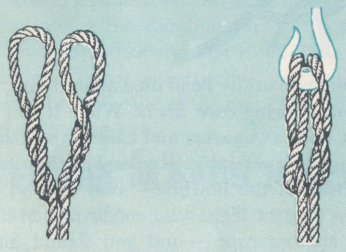
HOOK HITCH FOR A MODERATE LOAD

This is a practical Hitch for use if the end of a rope is short, but is never entirely trustworthy. It is satisfactory for a moderate load if the tension is never allowed to slacken.

It consists of a loop with the end of the rope passed under the standing part and across the hook. Under strain, the hauling part jams and holds the end against the hook.

THE CATSPAW

HOOK HITCH FOR HEAVY LOADS



This is the Hook Hitch generally tied in a "sling" or continuous wreath of rope — for heavy hoisting. It does not jam and unties by itself when removed from the hook.

It is tied by grasping two bights held well apart—and twisting each of them away from you. The two loops thus formed are then brought together and placed over the hook.

USE A BEND

TO TIE TWO ROPES TOGETHER

A Bend is tied when it is necessary to lengthen a rope by joining it to another. A Bend should be used for a temporary purpose only — if the joining is intended to be permanent, a Splice (see p. 23) is both stronger and safer. In general, Bends should be tied only in two ropes of the same size, stiffness, and smoothness — otherwise the Bend is not considered dependable.

USE THE SHEET BEND TO

JOIN LIGHT AND MEDIUM ROPES

This is the common utility Bend used aboard ship, and unties easily without injuring rope fibers. While it can be tied in larger ropes, such as hawsers and cables, the Carrick Bend (see next page) is preferable. Remember that its construction is like that of the Bowline — only instead of an end being tied to its own bight, one end is tied to the bight in the end of another rope — and you should find it most easy to tie.

To Tie: Make an overhand loop with the end of one rope. Pass the end of the other rope through the loop thus formed, then up behind its standing part — then down through the loop again. Draw up tight.

THE CARRICK BEND

USED FOR HEAVY ROPES, HAWSERS, CABLES

The Carrick Bend is one of the strongest of knots. It cannot jam and it unties easily. Under strain it always draws up tight correctly — which is important, because very heavy ropes usually cannot be fully tightened by hand. However, (and although the precaution often is overlooked), for maximum security the ends always should be seized to the standing part.

To Tie: With one rope-end form an underhand loop — with both the free end and standing part pointing away from you. Start the second rope end beneath both sides of the loop. Cross it over the standing part of the first rope. Then under the free end of the first rope. Then over the left side of the loop. Cross it under itself — and let the second free end lie over the right side of the loop. Finish by seizing each end to the standing part.

THE FISHERMAN'S KNOT

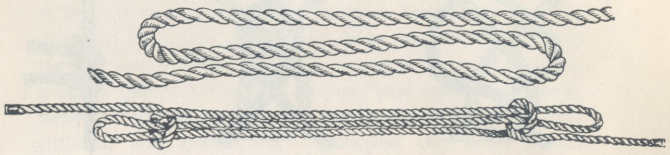
JOINS FISHLINES, SMALL ROPE, TWINE

The Fisherman's Knot is very strong and in common use by anglers. It's also a very handy knot to know in case you're short of twine and must join two lengths together for tying up a package.

To Tie: Lay the two ends together — each pointing in the opposite direction. Then tie an Overhand Knot in the end of each — *around* the standing part of the other. When drawn tight the two knots slide together, will not slip.

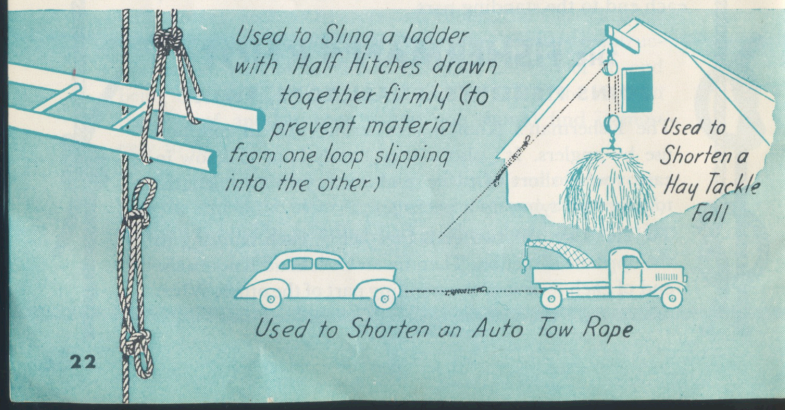
THE SHEEPSHANK

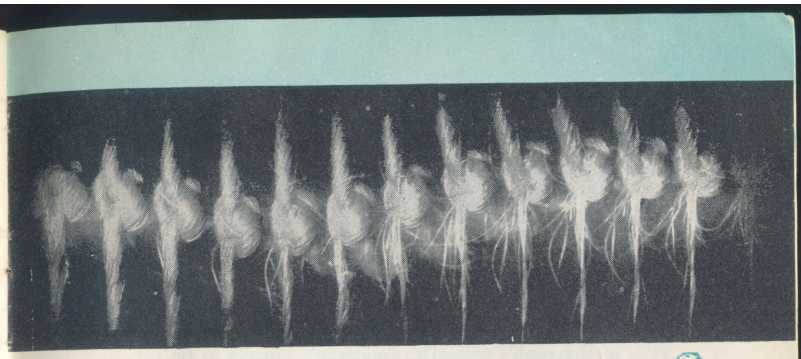
USED TO SHORTEN A ROPE



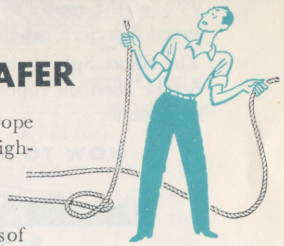
The Sheepshank is intended to shorten a rope for temporary use only. Carefully tied and drawn up tight, it is fairly reliable under a steady pull. But to make it secure for any length of time, both loops should be "stopped" to the standing parts. (An ordinary "Stopping" is made with marline or spunyarn. It consists of several round turns about the parts to be fastened together — the ends finished off with a square knot.)

To Tie: Form an S loop as shown in the top diagram, above. Then with one free end of the rope make a Half Hitch and slip it over one of the loops. Tighten. Repeat procedure with the other loop.


Used to Sling a ladder with Half Hitches drawn together firmly (to prevent material from one loop slipping into the other)
Used to Shorten a Hay Tackle Fall
Used to Shorten an Auto Tow Rope



WHY SPLICING IS SAFER



Here is a photographic sequence of *knotted* rope yarns breaking — taken by one of the high-speed cameras at the Massachusetts Institute of Technology.

For these photographs, the ends of two strands of rope yarn were knotted together and the knot was then put under tension. While the knot itself did not part, the knotting process created a shearing effect on the fibers and lowered their resistance to strain. (While rope *yarns* were used for these photographs, the knotting process results in the same shearing effect in the case of actual rope.)

In splicing, the fibers are not subject to this weakening effect. Result: a good splice has up to 95% of the breaking strength of the rope . . . while a knot may weaken the rope as much as 50%. MORAL: Whenever possible, use a *splice* rather than a knot.

TYPICAL KNOT EFFICIENCIES

In this table, the efficiency of the knot is expressed in the percentage of hauling strength which that knot has, as compared with the actual tensile strength of the rope being knotted. Although typical, these figures will, of course, vary somewhat with the individual knot.

Bowline	50%
Bowline on Bight	60%
Square	50%
Weaver's	60%
Short Splice	95%
Long Splice	90%

THE SHORT SPLICE

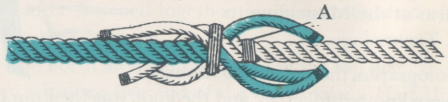
STRONGEST, MOST PERMANENT WAY TO JOIN TWO ROPES — OR TO MAKE A SLING FOR HOISTING

The Short Splice is used to join two ropes together — or two ends of the same rope, to make a "sling" or continuous wreath of rope. A sling is tied around an object to attach it to a hook for hoisting.

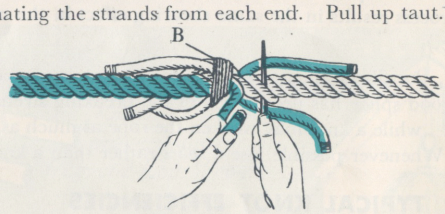
No knot or splice is as strong as the rope itself. But the average efficiency of knots varies from 50% to 60% of the rope itself — where a well-made splice will have 85% to 95% of the rope's strength. Splices are always to be preferred therefore, when the load is heavy.

The Short Splice, though the strongest of the splices, can not be used on rope which is to run through a correctly sized pulley.

HOW TO MAKE A SHORT SPLICE

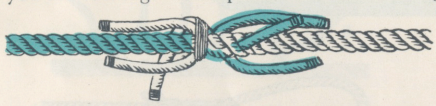


1. Lash rope about twelve diameters from each end (A). Unlay the strands up to the lashings. Whip strands to prevent untwisting and put together as in diagram above, alternating the strands from each end. Pull up taut.



2. Now tie down all the strands temporarily (B). Take off the lashing from one side of the rope and raise one strand on this side, using a fid. Take the middle strand of the opposite side. Tuck it over one strand and under the raised strand. Pull it up taut.

Every time you tuck a strand, let out a little of the turn. And be sure to keep some tension on the raised strand under which you are tucking. This prevents strand kinking.



3. Tuck against the twist or "lay" of the rope. What happens is that the tuck goes over one strand, under the second, and out between the second and third.

4. Roll the rope toward you. Pick up the second strand. Repeat the same operation. Then do it again with the third strand. You have now made one full tuck.

To taper the splice, first make one more tuck just like the first one. Then make the third tuck the same way, but first cut off ⅓ of the yarns from the strands. For the fourth tuck, cut off ½ the remaining yarn.

For the untapered short splice, you do not cut the strands. You just make three more tucks, exactly like the first one.

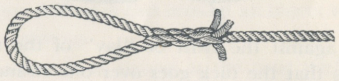
5. Take both lashings (which were applied in No. 1 and No. 2) off the other side of the rope. Repeat above operations.

6. To finish, cut off ends of strands, leaving about one or two inches protruding.

To Splice Nylon Rope — The above procedure applies to splicing of nylon and other synthetic ropes except that one additional full tuck should be used.

THE EYE SPLICE

STRONGEST, MOST PERMANENT ROPE LOOP



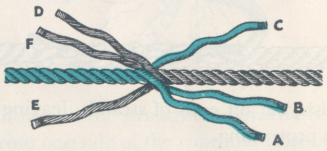
An Eye Splice is used in the end of a rope for mooring and in place of the Honda Knot for making a Lariat. (See page 12.) The Eye Splice is made exactly like the Short Splice, except that it is made with one rope. The end after being unlaid is bent around to form the eye, and is spliced into its own strands of the standing part.

MAKE A LONG SPLICE

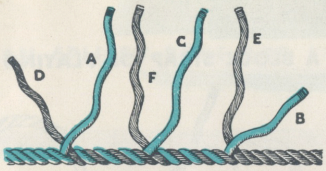
TO RUN THROUGH A PULLEY

The Long Splice is slightly weaker than a Short Splice, but allows the rope to run through a pulley without obstruction and lessens wear and chafing of the rope fibers at the point of splicing. A Long Splice should be made only with two ropes of the same size.

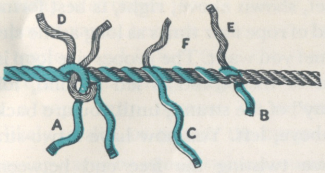
HOW TO MAKE A LONG SPLICE



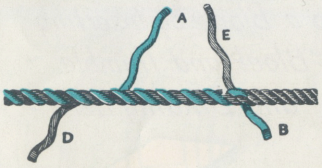
1. Unlay the end of each rope about 15 turns and place the ropes together, alternating the strands from each end, as shown above.



2. Start with any opposite pair, unlay one strand and replace it with strand from the other part. Repeat operation with another pair of strands in the opposite direction as shown above.



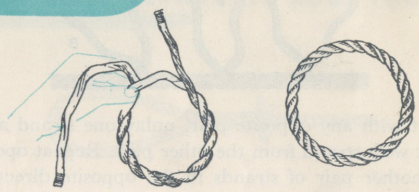
3. Now tie each pair of opposing strands, as B and E above, with an overhand knot, tuck each strand twice, as in the Short Splice, and then twice more as for the Tapered Splice — see page 25. Or, halve each strand (see A and D), and tie with an overhand knot before tucking. By this latter method a smaller splice results — but at a considerable sacrifice of strength.



4. Roll and pound well before cutting strands off close to rope.

GROMMET

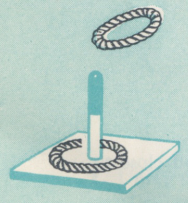
A ROPE RING FOR A BLOCK STRAP OR PLAYING QUOITS



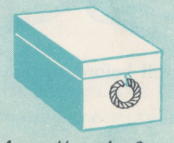
The Grommet, shown above, right, is best formed by using a single strand of rope four times as long as the circumference of the Grommet you want. The proper size loop is first made, the long end of the strand is led around, following the grooves or "lay" of the strand, until you are back where you started. See above, left. You now have a two-stranded ring.

Then continue twisting the free end between the turns already made until the three-strand ring is complete. The two ends are now tied with an overhand knot and the remaining ends passed underneath the nearest strands, and trimmed closely. If a strong twist is kept on the strand while laying up the Grommet, the finished ring will be as firm and smooth as a finished rope.

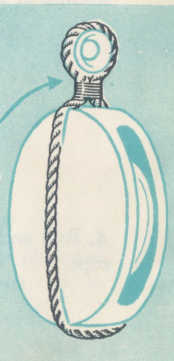
Used to Strap a Block by inserting Block and Thimble and Binding Here



Used in Playing Quoits

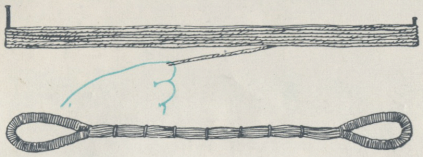


As a Handle for a Chest



SELVAGEE STRAP

STRONGER THAN SPLICED ROPE FOR SLINGING CARGO



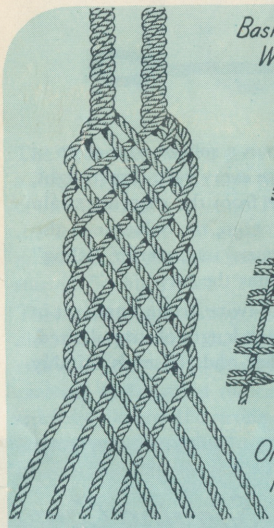
The Selvagee Strap is stronger than a spliced rope strap of the same number of yarns, because every yarn lays straight, has the same tension, and is free from the shearing strain present in the rope. In handling cargo, the Selvagee is also preferable to a rope strap because its superior "cling" makes it less likely to slip, or to mar the cargo.

Make it by passing yarns or strong twine around nails set in a board and spaced according to the length of strap desired. The whole is then bound together and the ends suitably served.

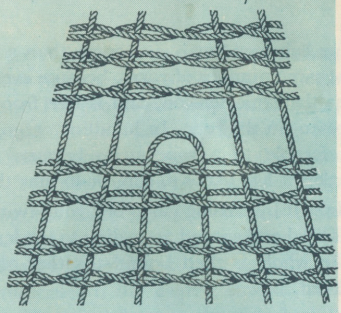
Used for Slinging Cargo

SOME INTERESTING EXAMPLES OF

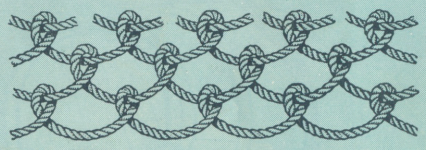
DECORATIVE AND USEFUL KNOTS



Basketmaker's Method of Warp Insertion. Turned Woven Basketry



Ornamental Cradle Lashing made by the Ozark Bluff Dwellers 1000 to 500 B.C. Using a Braided Cord.



Basketmaker's Coiled Netted Fabric